

Claim 1 has been amended to include a limitation substantially similar to that of cancelled claim 8. Thus, Applicants submit that the § 102 rejections at paragraphs 6, 7, and 12 of the Office Action, which were applied against claim 1 but not claim 8, are no longer applicable. Additionally, Applicants submit that the § 103 rejections at paragraphs 14-16 of the Office Action are no longer applicable, as claim 8 was not rejected under § 103, and all of the claims rejected under § 103 now depend from amended claim 1. Reconsideration and withdrawal of the remaining rejections are requested in view of the following amendments and remarks.

Semiconductor manufacturing is necessarily performed in a clean room environment. The clean room has various extreme requirements in terms of materials, airflow, air quality, seals, etc. These requirements make clean room construction and operation complex and costly. Consequently, there is a strong motivation in the semiconductor manufacturing industry to maximize clean room manufacturing capacity or throughput, while minimizing contamination levels and clean room size. As described in the application, the claimed invention addresses these issues by providing a compact, yet efficient, design that significantly reduces or eliminates semiconductor wafer contamination.

Specifically, the claims describe a system for processing flat media that includes an indexer at a first elevation and a docking station at a second elevation that is higher than, or above, the first elevation. An elevator is moveable between the indexer and the docking station for raising pods containing flat media from the indexer to the docking station. A process robot is also employed for moving the flat media from a transfer station located adjacent to the docking station to a process station for processing.

As is well known in the art, air flows downwardly through the system to reduce contamination by airborne particles. In the claimed design, the indexer is at a lower position. However, as the wafers or flat media are within the pods at the indexer, the potential for contamination by airborne particles at the indexer is minimal. The transfer station, where the wafers are no longer protected within a pod, is vertically above the indexer. However, at this vertical position, the risk of contamination is reduced due to the downward air flow.

With this design, the overall size and footprint of the system is reduced because the transfer station is located above the indexer, as opposed to being located to the side or offset laterally from the indexer as is typical in existing systems. As a result, the claimed system is very compact.

Turning to the prior art, none of the cited references, alone or in combination, disclose a processing system having an indexer located at a lower elevation than a docking station, and an elevator for moving a pod vertically from the indexer to the docking station, as claimed.

Ohasi 5,603,777, cited at paragraph 8 of the Office Action, discloses a system for transferring substrates from a transport cassette to a processing cassette, such that the substrates are properly positioned in respective storage spacing arrangements of the transport and processing cassettes (col. 3, lines 5-17). Ohasi further teaches using a treatment robot 23 including a lift 234 with hooks 237 for raising a transport cassette 8 from a posture change robot 22. The treatment robot 23 then moves the cassette 8 over a treating bath 21a and lowers the processing cassette 8 into the treating bath 21a (col. 8, lines 8-30; Fig. 8). Ohasi does not disclose an indexer positioned at an elevation lower than a docking station. Ohasi further does not disclose an elevator for moving a pod vertically from an indexer to a docking station.

Specifically, the depositories 51 in Ohasi, characterized as an indexer in the Office Action, do not index the transport cassettes 7. Rather, a transport cassette transport robot 52 is provided for transporting the transport cassettes 7 from a first depository 12, through the depositories 51, to another depository 33 (col. 16, lines 3-6). The depositories 51 are simply locations used to position individual transfer cassettes 7, and they do not index the transfer cassettes 7 from depository to depository. The transport robot 52 also does not index the transfer cassettes from depository to depository, but instead places each cassette 7 in a single predetermined depository 51 or 33 (col. 16, lines 7-25). Thus, Ohasi does not disclose an indexer.

Additionally, the Office Action states that the docking station in Ohasi is “the location...[where the] robot 22 hands the carrier 8 to the process robot 23.” The transfer of the cassette 8 between the two robots, however, does not occur at a docking station, or at any other station, but is instead a direct transfer between the posture change robot 22 and the surface treatment robot 23 (col. 13, lines 8-21; Fig. 8). The cassette 8 is never docked, and Ohasi therefore does not disclose a docking station positioned at a higher elevation than an indexer, as claimed.

The Office Action further states that Ohasi discloses a robot 22 having a docking station elevator 224c for moving a pod from a first elevation to a second elevation. The posture change robot 22 does include a lift 223 for raising a cassette 8 on the posture change robot 22 so that hooks 237 on the surface treatment robot 23 may engage the cassette 8 (Fig. 8). The lift 223, therefore, raises the cassette 8 from the posture change robot 22 to the surface treatment robot 23, not from an indexer to a docking station, as claimed.

Turning to the Iwama reference cited at paragraph 9 of the Office Action, Iwama does not disclose a docking station at an elevation higher than an indexer, or a transfer station adjacent to a docking station, as claimed. In fact, Iwama does not disclose a docking station at all. Rather, Iwama discloses a conveyor machine 120 having a lifter 122 with a pair of arms 121a, 121b for lifting wafer carriers C from a plurality of stations 112a...112n. The conveyor machine then moves the wafer carriers C over holders 133/135 in a relay section 130. The holders 133/135 pass through the bottom of the carriers C to lift wafers W out of the carriers and transfer them to a wafer transfer unit 140, which in turn transfers the wafers W to a cleaning section 200 (col. 4, line 60-col. 5, line 50; Fig. 2).

Thus, the carriers C are never moved to a docking station, but are instead lifted from the stations 112 by the lifter 122 and moved directly over wafer holders 133/135 in a relay station 130. While the carriers C are suspended in space by the lifter 122, i.e., not at a docking station, the holders 133/135 lift the wafers W from the carriers C. Thus, the carriers C are never docked at a docking station or other location, and they are not moved by an elevator from an indexer to a docking station at a higher elevation, as claimed.

Additionally, the space or location above the stations 112, characterized as a docking station in the Office Action, is not adjacent to a transfer station. In fact, the relay station 130 and wafer transfer unit 140 are located at a lower elevation than both the area or space above the stations 112, and the stations 112 themselves. Thus, the transfer station is not at a second elevation that is higher than the elevation of the stations 112, and the transfer station is not adjacent to a docking station at the higher second elevation, as claimed. Accordingly, Iwama has a completely different structure than, and lacks the claimed elements outlined above.

Turning to paragraph 10 of the Office Action, Davis discloses a system for processing wafers without using wafer carriers to transport the wafers throughout the processing system (Abstract). Hence, there is no docking station.

The wafer transfer mechanism 800 in Davis does not move a pod vertically from an indexer to a docking station, as claimed, but instead moves a carrier 79 from a deck 750 to a pair of rotating brackets 730 (Figs. 14-19). The wafers themselves are then lifted from the brackets 730 by a robotic conveyor 15 (col. 10, lines 59-61; Figs. 20-21). The carriers 79, however, are not lifted from the brackets 730, or indexer, as claimed.

Additionally, Davis does not disclose a docking station adjacent to a transfer station above an indexer, as claimed. The carriers 79 in Davis are separated from the wafers before the wafers enter the indexer, or rotating brackets 730 (Fig. 14). Thus, there is no motivation or suggestion to use a docking station, since the wafers are already separated from the carrier when they enter the indexer. Moreover, the robotic conveyor 15 lifts the wafers directly from the rotating brackets 730, and there is therefore no reason to employ a docking station above the brackets 730.

Turning to paragraph 11 of the Office Action, Fisher does not disclose an elevator for moving a pod vertically from an indexer to a docking station, as claimed. Rather, Fisher discloses a ferris wheel sub-assembly 117 for lifting wafer carriers 50 from an input queue and transporting them in a semi-circumferential manner to a vertical transfer sub-assembly 150 (col. 7, lines 3-40). By raising pods vertically (i.e., “perpendicular to the plane of the horizon or to a primary axis,” Merriam-Webster Collegiate Dictionary, 2002), the claimed invention requires less operating space than a system employing a ferris wheel that circumferentially lifts wafer carriers. This is an

important distinction, since minimizing clean room size is an important objective in the semiconductor wafer industry, as explained above.

Furthermore, the vertical transfer sub-assembly 150 in Fisher is not a docking station adjacent to a transfer station, as claimed. Rather, the vertical transfer sub-assembly 150 in Fisher lifts tube-loads of carriers from the ferris wheel 117, and lowers the wafer carriers to a quartzware receiving station for processing of the wafers (col. 7, lines 37-40; col. 9, lines 3-43). Thus, the vertical transfer sub-assembly 150 is a motive transfer means for moving wafer carriers within the processing system, not a stationary docking station where wafers may be removed from a pod.

Turning to paragraph 13 of the Office Action, Sakamoto discloses a printed circuit board (PCB) load-unload system for transferring PCBs between a PCB processing device and stock means (col. 2, lines 21-25). The PCB processing device described in Sakamoto is used to mount integrated circuits onto PCBs (col. 3, lines 46-55), not to clean and process semiconductor wafers. Thus, Sakamoto is largely unrelated to the claimed invention.

Specifically, the elevators in Sakamoto do not transfer a pod from an indexer to a docking station, as claimed. Rather, the elevators transfer PCBs between a magazine and a load/unload portion of a PCB processing station, and further transfer magazines between upper and lower conveyors (col. 2, lines 32-40; claim 1; Fig. 3). Additionally, Sakamoto does not disclose a docking station adjacent to a transfer station, as claimed. Indeed, Sakamoto does not disclose a docking station at all. Rather, in Sakamoto, PCBs are transferred from a magazine M to a guide rail means 41, via a piston rod, while the magazine M remains in an elevator 7 (col. 6, lines 6-12). Thus, the

magazine is not first transferred to a docking station, and there is no motivation or suggestion to use a docking station in the Sakamoto system.

Additionally, the hand 46 ("robot") in Sakamoto is not moveable between a transfer station and a process station, as is the claimed robot. Rather, the hand 46 is vertically moveable by a cylinder 47 to descend onto an X-Y table 2 to mount a PCB thereon (col. 5, lines 54-57; col. 6, lines 15-17). Thus, the hand 46 is not used to move flat media between a transfer station and a process station, as claimed, but is instead used to mount a PCB on an X-Y table. The PCB is also not transferred to the hand 46 by a robot. Rather, the PCB is transferred 43 along guide rails 41 by a claw 44 on a chain (col. 6, lines 12-15). Thus, Sakamoto lacks several of the claimed limitations.

In view of the foregoing, it is submitted that the claims are in condition for allowance, and a Notice of Allowance is requested.

Respectfully submitted,

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Marked Up Version of Claims To Show Changes Made

1. (Amended) A system for processing flat media, comprising:
 - an indexer at a first elevation;
 - a docking station at a second elevation higher than the first elevation;
 - an elevator for vertically raising a pod containing flat media from the first elevation to the docking station;
 - a transfer station adjacent to the docking station;
 - a process station; and
 - a process robot movable between the transfer station and the process station, for moving flat media between them.
21. (Amended) The system of claim 18 further comprising a generally horizontal deck separating the indexer from the transfer station.
22. (Amended) A system for processing flat media, comprising:
 - an indexer having a first row and second row parallel to the first row, with each of the first and second rows having a plurality of pod holding positions, and at least one shuttle device for moving a pod from the first row to the second row;
 - a docking station [adjacent to the transfer station with the docking station] having first and second pod docking positions;

a first docking station elevator associated with the first row of the indexer, for moving a pod vertically between the first row of the indexer and the docking station;

a second docking station elevator associated with the second row of the indexer, for moving a pod vertically between the second row of the indexer and the docking station;

a transfer station above the indexer and adjacent to the docking station, a transfer station robot in the transfer station, and at least one carrier loading position in the transfer station, with the transfer station robot moveable to carry a flat media article from a pod at the docking station to a carrier at the transfer station;

at least one process station;

a process robot having an end effector for engaging and lifting the carrier at the transfer station and movable between the transfer station and the process station, for moving flat articles between them.